12. The cells of the venter undergo many divisions and develop a protective covering called the calyptra.

13. By the middle of August a differentiation of cells is seen in the larger end of the young embryo. The inner ones are the archesporial cells and the outer ones will form the capsule wall.

14. The calyptra which has kept pace with the growth of the embryo now ceases development.

15. About August 15, the cells in the archesporial region differentiate into spore mother cells and elater-forming cells.

16. The three regions of the sporogonium (capsule, seta, foot) begin to be evident.

17. Development goes on with great rapidity until by the last of August the slightly lobed spore mother cells and nucleate elaters are to be seen occupying the space within the capsule.

18. The sporogonium is now (Aug. 28) fully formed with its globular capsule, short seta, and pointed, conical foot.

19. The wall of the capsule consists generally of two layers of cells, except in the region of the base where there are usually one or two more layers.

20. Early in September the spore mother cells all become lobed.

21. Throughout September and October the spore mother cells remain in the lobed condition and not until October do the spiral thickenings appear on the walls of the elaters.

22. By the middle of November the lobed spore mother cells have divided to form the oval spores.

23. By the last of November the first stages of germination have taken place, each spore being divided into a several-celled body.

24. No further change takes place in the spores until they are shed in April.

25. The abundance or lack of moisture has a marked influence on the development of the plants. Those growing in moist situations are more advanced on a given date than those of a drier location.

26. Plants in a very moist habitat are very apt to be sterile.

27. Those most thoroughly fruited are found on drier soil.

ADDITIONS TO THE LICHEN FLORA OF SOUTHERN CALIFORNIA. No. 6.

By H. E. HASSE, M. D.

Heppia Zahlbruckneri spec. nov.

Thallus of short, erect, terete to subterete lobules, 1 to 2 mm thick and 3 to 3.5 mm high, aggregated into groups and loosely attached to the substrate by medullary hyphae; the apices are clavate to bulbous, often spreading and assuming a flattened top; the color is olive-green and darkening. The pseudoparenchymatous cortex, containing the gonidial layer, is 40 μ thick, the pale green *Scytonema* gonidia are

6 μ to 12 μ in diam.; the medullary layer is composed of hyphae loosely interwoven, especially at the axis, and 2 μ to 3 μ thick. Apothecia, from 1 to 8 in a lobule head, are immersed, marked by a punctiform perforation of the cortex, sometimes slightly dilated to not exceeding 0.25 mm in width and depressed; disk dull brown; the flesh-colored, flattened-globular hymenium is beneath the gonidial layer. Thecium 140 μ high, colorless; paraphyses loose, coherent, slender; hypothecium colorless or of a pallid yellowish tint; asci quite numerous, upper part slightly attenuated, the membrane about 3 μ thick throughout, 112 μ long, 28 μ to 32 μ thick, the immature asci are shorter with solid thickened tops. Spores globular, 4, 5 μ to 7 μ in diameter (the liberated spores giving the larger measurement), 24 to 32 being contained in the ascus; hymenial gelatine with iodine a pale indigo blue, changing to sordid pale greenish. KHO gives a bronze red color to the gonidial layer; spermatia not seen. The species differs from others with similar spore measurements in the shape of the thalline lobules.

On quartz in Rubio Cañon, San Gabriel Range, near Pasadena, the type locality. Collected by Mr. C. C. Kingman. The same species has since been found near Riverside by Mr. F. M. Reed.

I take pleasure in naming this latest addition to the West-American Heppiae for Dr. A. Zahlbruckner.

Type deposited with Dr. A. Zahlbruckner and type duplicate in herb. Hasse.

Bacidia Kingmani spec. nov.

Thallus poorly represented by small, congregated or scattered, sordid light olive-green, imbricated squamules, or evanescent, these when present about 0.5 mm wide, flat or conchiform; hypothallus indistinct. Apothecia sessile or substipitate, 2 to 3.5 mm wide, disk dull black, flat to convex, often with a faint grayish bloom, the persistent proper margin turgid, gray pruinose, generally strongly crenate-sinuose. Epithecium subcontinuous, bluish-black; thecium colorless, 88 μ high; paraphyses coarse, scarcely thickened above and with light brown tips; hypothecium dark brown, thicker than the thecium; asci narrowly clavate, not reaching to the epithecium and 8 μ to 10 μ thick; spores colorless, blunt fusiform, 4-to 5-locular, 14 μ to 20 μ long, 3.5 μ to 4 μ thick, often slightly curved, the septa indistinct; hymenial gelatine with iodine dark blue.

On quartzose rock in the San Gabriel Range along the "New Trail" to Mt. Wilson, collected by Mr. C. C. Kingman.

The following species have been collected by Dr. J. N. Rose in Lower California:—

Lecanora atra (Huds.) Ach. On conglomerate, East Benito Island, March 9th, 1911. (Rose 925)

Caloplaca murorum (Hoffm.) Th. Fr., East and San West Benito Island (Rose 86)

On the same piece of rock occur minute apothecia of *Blastenia ferruginea festiva* (Nyl.) ?, the thallus absent.

Caloplaca Rosei spec. nov.

Thallus crustaceous, adnate, sordid, pale yellowish, minutely areolate, surrounded by a closely adnate, delicately linear-laced to almost smooth, fan shaped spreading, pale yellow hypothallus. Thallus with KHO crimson; hypothallus with KHO pale orange, neither stained with Ca $(Cl\,0)_2$; apothecia sessile, 0 5 to 1 mm wide, the flat to slightly convex disk vittelline yellow with an entire margin of a somewhat paler color. Epithecium granulose, rich yellow; thecium colorless, 68 μ to 72 μ high; paraphyses loosely coherent, furcate and septate beneath the subglobular pale yellow heads; hypothecium colorless; asci 8-spored, clavate, 50 μ to 60 μ long, 12 μ to 14 μ thick; spores oblong-ellipsoid, some polari-locular with connecting tube, others having the cells approximate, 12 μ to 16 μ long, 4 μ to 8 μ thick; hymenial gelatine with iodine blue; epithecium with KHO carmine, the other hymenial structures a light pink, or mostly, without reaction. The distinctive hypothallus and chemical reactions have induced the recognition of this species as new, and it is named for its collector, Dr. J. N. Rose of the Smithsonian Institution.

On quartzose rock, San Roque, Lower California, March 15th, 1911, (Rose 928)

Associated with it are *Buellia stellulata* (Tayl.) Mudd. (Rose 927), and a sterile *Xanthoria*, probably *X. lychnea pigmaea* (Bor.) Th. Fr.

Dirina Catalinariae spec. nov.

Thallus determinate, thick, areolate-rimose, white, reaction with KHO yellowish, with Ca $(Cl0)_2$ pinkish-red, the algae are *Chroolepus* Apothecia 1.5 to 2 mm wide, substipitate upon a short thick thalline elevation; disk round or slightly angular, dark but covered by a dense white pruina, proper margin thin, hidden by a turgid thalline one, which later becomes thinner. Epithecium granulose, sordid, pallid yellowish; thecium colorless, 120 μ to 140 μ high; paraphyses loosely coherent, with fine granular interior, not well defined; hypothecium thick, dark brown, on section appearing black to the unaided eye, its upper surface concave, the lower projecting downward with an acuminate central point into the medulla of the stipular elevation; asci clavate, 72 μ long, 16 μ thick, the membrane thick throughout; spores fusiform, their ends rounded, straight or lightly curved, epispore distinct, 24 μ to 30 μ long, 6 μ to 8 μ thick; hymenial gelatine gradually vinous red with Iod., KHO—; the asci are numerous, but spores are rare and but few are seen with spores. In place of apothecia many of the substipular elevations are capped by isidiose heads. Spermatia were not found.

Type locality, Catalina Island on beach boulders near Avalon, May, 1911. Type in herb. Hasse.

An interesting addition to the two corticular species of Southern California and the one saxicolar species of the northern coast.